



[6560-50-P]

ENVIRONMENTAL PROTECTION AGENCY

[EPA-OW- EPA-HQ-OW-2011-1013; FRL-9671-1]

Permitting Guidance for Oil and Gas Hydraulic Fracturing Activities Using Diesel Fuels – Draft: Underground Injection Control Program Guidance #84

AGENCY: Environmental Protection Agency (EPA).

ACTION: Request for Comment on Draft Guidance Document.

SUMMARY: EPA is taking comment on a draft document that describes Underground Injection Control (UIC) Program guidance for permitting the underground injection of oil-and gas-related hydraulic fracturing (HF) using diesel fuels where the U.S. Environmental Protection Agency (EPA) is the permitting authority. The draft guidance includes EPA's interpretation of the Safe Drinking Water Act (SDWA) and regulations regarding UIC permitting of oil and gas hydraulic fracturing operations using diesel fuels as a fracturing fluid or as a component of a fracturing fluid, specifically that they are subject to Class II UIC permitting requirements. EPA's goal is to provide greater regulatory clarity and certainty to the industry, which will in turn improve compliance with the SDWA requirements and strengthen environmental protections consistent with existing law. The draft guidance will not impose any new requirements. See Supporting Information section.

DATES: EPA will consider comments received on or before **[INSERT DATE 60 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Submit your comments, identified by Docket ID No. **EPA-HQ-OW-2011-1013** by one of the following methods:

- www.regulations.gov: Follow the on-line instructions for submitting comments.
- Email: OW-Docket@epa.gov
- Mail: Permitting Guidance for Oil and Gas Hydraulic Fracturing Activities Using Diesel Fuels - Draft, Environmental Protection Agency, Mailcode: 4606M, 1200 Pennsylvania Ave., NW, Washington, DC 20460.
- Hand Delivery: Office of Water (OW) Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. **EPA-HQ-OW-2011-1013**. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at www.regulations.gov, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through www.regulations.gov. The www.regulations.gov website is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through www.regulations.gov your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of

encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at <http://www.epa.gov/epahome/dockets.htm>. *Docket:* All documents in the docket are listed in the www.regulations.gov index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in www.regulations.gov or in hard copy at the OW Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the OW Docket is (202) 566-2426.

FOR FURTHER INFORMATION CONTACT: Chitra Kumar, Underground Injection Control Program, Drinking Water Protection Division, Office of Ground Water and Drinking Water (MC-4606M), Environmental Protection Agency, 1200 Pennsylvania Ave., NW, Washington, DC 20460; telephone number: (202) 564-2232; e-mail address: kumar.chitra@epa.gov. For general information, visit the Underground Injection Control Program's Hydraulic Fracturing and the Safe Drinking Water Act website, <http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/hydraulic-fracturing.cfm>.

SUPPLEMENTARY INFORMATION:

I. General Information

A. Does this Action Apply to Me?

Underground injection of fluids through wells is subject to the requirements of the SDWA except where specifically excluded by the statute. In the 2005 Energy Policy Act (EP Act), Congress revised the SDWA definition of “underground injection” to specifically exclude from UIC regulation the “underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities” (SDWA Section 1421(d)(1)(B)). UIC regulations further provide that “[a]ny underground injection, except into a well authorized by rule or except as authorized by permit issued under the UIC program, is prohibited” (40 CFR 144.11). Thus, owners or operators who inject diesel fuels during HF related to oil, gas, or geothermal operations must obtain a UIC permit before injection begins. While the EP Act references HF related to geothermal activities, the draft guidance only covers hydraulic fracturing using diesel fuels related to oil and gas activities. Permits for oil and gas HF using diesel fuels are available through the UIC Class II Program, the well class for oil and gas activities.¹

The guidance provides information on SDWA UIC Class II requirements and recommendations for permitting hydraulic fracturing injection wells where diesel fuels are used in fluids or propping agents. The guidance is intended for EPA permit writers and, as a result, is relevant where EPA directly implements the UIC Class II program. Implementation of the UIC Program may be carried out by EPA Regions, or by states, tribes, or territories, depending on whether a state has received primary enforcement responsibility (primacy) approval from EPA to implement the UIC Program (Reference to “states” includes tribes and territories pursuant to 40 CFR 144.3). To the extent that states may choose to follow some aspects of EPA guidance in implementing their own programs, it may also be relevant in areas where EPA is not the

¹ Geothermal activities are not considered Class II.

permitting authority. Information on states that have primacy is available at <http://water.epa.gov/type/groundwater/uic/Primacy.cfm>.

Recommendations in this draft guidance may change based on the comments we receive on the draft publication and this will be reflected in the final guidance. EPA understands that a permit writer who receives a permit application in the interim period before this guidance is finalized will have to make decisions about how to permit diesel fuels hydraulic fracturing wells. While this guidance undergoes public notice and comment, EPA expects that decisions about permitting hydraulic fracturing operations that use diesel fuels will be made on a case-by-case basis, considering the facts and circumstances of the specific injection activity and applicable statutes, regulations and case law, and will not cite to this draft guidance as a basis for decision.

Decisions made regarding a particular permit will be based on the applicable statutes, regulations, and case law, and at times may differ from the recommendations described in this guidance. Thus, this document will not impose legally binding requirements and will not be implemented as binding in practice; nor will it impose any obligations on private parties. Legally binding requirements for injection wells are found at 40 CFR Parts 124 and 144 through 148.

EPA UIC permit writers reviewing diesel fuels HF permit applications should refer to the provisions at 40 CFR Parts 124 and 144 through 147 as they make permitting decisions. This guidance does not substitute for UIC Class II regulations and is not itself a regulation. EPA focused on specific topics in this guidance, which are useful for tailoring Class II requirements to the unique attributes of hydraulic fracturing when diesel fuels are used.

The technical topics covered in the draft guidance include: a description of diesel fuels; authorizing multiple wells through area permits; establishing a permit duration and applying UIC well closure requirements; considerations for application submission and review; determining an

area of review; permit application materials; well construction requirements for both newly constructed and already constructed wells; operation, mechanical integrity, monitoring and reporting requirements; applicable financial responsibility requirements; and public notification and environmental justice considerations.

B. What Should I Consider as I Prepare My Comments for EPA?

1. Submitting CBI. Do not submit this information to EPA through www.regulations.gov or e-mail. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD ROM that you mail to EPA, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is claimed as CBI). In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.
2. Tips for Preparing Your Comments. When submitting comments, remember to:
 - Identify the guidance by docket number and other identifying information (subject heading, Federal Register date and page number).
 - Follow directions - The agency may ask you to respond to specific questions or organize comments by referencing a Code of Federal Regulations (CFR) part or section number.
 - Explain why you agree or disagree; suggest alternatives and substitute language for your requested changes.
 - Describe any assumptions and provide any technical information and/or data that you used.

- If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for it to be reproduced.
- Provide specific examples to illustrate your concerns, and suggest alternatives.
- Explain your views as clearly as possible, avoiding the use of profanity or personal threats.
- Make sure to submit your comments by the comment period deadline identified.}

3. Request for Comment:

EPA has decided to seek public input on the draft guidance because of the importance of the guidance to its Federal and state partners, to the regulated community, and to the public.

Additionally, EPA believes considering and receiving public input will ensure that the guidance adequately addresses remaining questions raised about permitting HF using diesel fuels. This public comment opportunity will be available until **[INSERT DATE 60 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**. Although the Administrative Procedure Act requirements for notice and comment do not apply, EPA will consider significant public comments and will address significant issues raised by the public when the final guidance is issued.

EPA will provide the final version of the guidance to permit writers where EPA is the UIC permitting authority. EPA expects that the interpretation and recommendations in the final guidance may also be useful to state permit writers.

EPA requests that commenters focus their comments on the following issues, as this will be most helpful to the Agency and facilitate efficient consideration of comments.

a. Diesel Fuels Description.

1. The draft guidance recommends using six Chemical Abstracts Service Registry Numbers (CASRN)s as the basis for determining whether diesel fuels are used as

fluids or propping agents pursuant to hydraulic fracturing operations related to oil or gas production activities. The draft guidance, directed toward EPA UIC permit writers, recommends considering whether any portion of the injectate has the following CASRNs, or is referred to by any of their associated common synonyms, some of which are provided as follows:

68334-30-5 Primary Name: Fuels, diesel

Common Synonyms: *Automotive diesel oil; Diesel fuel; Diesel oil (petroleum);*

Diesel oils; Diesel test fuel; Diesel fuels; Diesel Fuel No. 1; Diesel fuel [United Nations-North America (UN/NA) number 1993];

Diesel fuel oil; European Inventory of Existing Commercial Chemical Substances 269-822-7

68476-34-6 Primary Name: Fuels, diesel, no. 2

Common Synonyms: *Diesel Fuel No. 2; Diesel fuels no. 2; EINECS 270-676-1, No. 2 Diesel Fuel*

68476-30-2 Primary Name: Fuel oil No. 2

Common Synonyms: *Diesel fuel; Gas oil or diesel fuel or heating oil, light [UN1202]*

#2 Home heating oils; API No. 2 fuel oil; EINECS 270-671-4; Fuel Oil No. 2; Home heating oil No.2; Number 2 burner fuel; Distillate fuel oils, light; Fuel No. 2; Fuel oil (No. 1,2,4,5 or 6) [NA1993];

68476-31-3 Primary Name: Fuel oil, no. 4

Common Synonyms: Caswell No. 333AB (A Caswell No. is an alphanumeric chemical identifier implemented by Robert L. Caswell in the 1960s and 1970s in conjunction with acceptable common names of pesticides names for labeling purposes); Cat cracker feed stock; EINECS 270-673-5; EPA Pesticide Chemical Code 063514; Fuel oil no. 4; *Diesel Fuel No. 4*

8008-20-6 Primary Name: Kerosene

Common Synonyms: JP-5 navy fuel/*marine diesel fuel*; Deodorized kerosene; JP5 Jet fuel; AF 100 (pesticide); Caswell No. 517; EINECS 232-366-4; EPA Pesticide Chemical Code 063501; Fuel oil No. 1; Fuels, kerosine; Shell 140; Shellsol 2046; Distillate fuel oils, light; Kerosene, straight run; Kerosine, (petroleum); Several Others

68410-00-4 Primary Name: Distillates (petroleum), crude oil,

Common Synonyms: *Fuel, diesel (VDF)* (U.S. EPA Substance Registry System), Straight PWN diesel (EPA SRS), Aruba gas oil; EINECS 270-072-8

Based on the six listed CASRNs, a review of data available on the voluntary hydraulic fracturing chemical disclosure website, FracFocus (<http://www.Fracfocus.org>), in early August, 2011, suggested that approximately 2% of wells that hydraulically fracture would be subject to SDWA UIC permitting requirements in states where EPA administers the UIC Program. This estimate is necessarily approximate due to data limitations. In addition, EPA is aware that operational practices are rapidly evolving in this industry, and past practice with regard to the use of diesel fuels may not be reflective of future practice.

EPA selected these six CASRNs because either their primary name, or their common synonyms, contained the term “diesel fuel” and they meet the chemical and physical

properties of “diesel fuel,” as provided in the Toxic Substances Control Act (TSCA) Inventory.² The TSCA description reads as follows:

Diesel fuel is a complex combination of hydrocarbons produced by the distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C9 through C20 and boiling in the range of approximately 163 °C to 357 °C (325 °F to 675 °F).

While this description provided in the guidance was derived from a particular CASRN in the TSCA Inventory, a number of chemical compounds could meet these characteristics, including all of the compounds included in the recommended list of CASRNs. These CASRNs are commonly identified as diesel fuels by other industry and regulatory applications, as well.

2. Alternative Descriptions: EPA also reviewed a number of alternative descriptions, as follows:

A. Diesel fuel is:

- A complex combination of hydrocarbons produced by the distillation of crude oil or the processing of other petroleum-derived hydrocarbons; and
- Having a carbon number range of C9 to C20; and
- Having a boiling point range of 163 degrees Centigrade (°C) to 357 °C (325 degrees Fahrenheit (°F) to 675 °F); and
- Could be used to run a diesel engine;

² TSCA Inventory Reporting Rule established the TSCA Inventory which now includes the identities of over 83,000 chemical substances.

OR

- Has any of the CASRNs, 68334-30-5, 68476-30-2, 68476-31-3, 68476-34-6, 8008-20-6, or 68410-00-4.

To address the possibility that permit requirements could be avoided for substances that are essentially the same as the diesel fuels description provided in the guidance even if they are not known by the name “diesel fuels,” EPA considered this diesel fuels description consisting of the chemical, physical, and use-based attributes of diesel fuels along with a list of CASRNs. One such compound, which does not have the synonym, “diesel fuels,” but has the same chemical and physical characteristics of diesel fuels and could be used to run a diesel engine, is CASRN 64741-44-2, Distillates (petroleum), Straight run middle; Gas oil; Gas oil, blend, EINECS 265-044-7. EPA also recognizes that new compounds are regularly introduced into the market and may meet the physical and chemical criteria of this TSCA description, and may or may not contain the words “diesel fuels” in the primary name or any of its synonyms.

This description does not correspond solely to a specific set of CAS Registry Numbers. Thus, under this approach, EPA is not able to estimate the number of oil and gas wells that hydraulically fracture that would be subject to UIC permitting requirements in states where EPA is the permitting authority.

B. Diesel fuel is a complex combination of hydrocarbons produced by the distillation of crude oil or the processing of other petroleum-derived hydrocarbons, having a carbon number range within C9 to C20 and a boiling point range within 163 °C to 357 °C (325 °F to 675 °F) and that may contain impurities, or are otherwise identified as diesel fuel. This approach would cover a greater number of CASRNs than the

- recommended description. EPA is not recommending this approach because it would include some compounds that are not suitable to run in a diesel engine, which is a consideration in several of the existing descriptions of diesel fuels that EPA reviewed.
- C. Diesel fuel is a complex combination of hydrocarbons produced by the distillation of crude oil or the processing of other petroleum-derived hydrocarbons, having carbon numbers predominately in the range of C9 to C20 and a boiling point range of approximately 163 degrees °C to 357 °C (325 degrees °F to 675 °F) and that may contain impurities. Under this description diesel fuels include any petroleum derived substance with CASRN's that overlap the diesel fuel predominant carbon range or boiling point range, or are otherwise identified as diesel fuel. This approach would cover a much greater number of CASRNs than the recommended description. EPA is not recommending this approach because it would include many compounds that are not suitable to run in a diesel engine, and would be challenging for permit writers and applicants to implement, based on the common methods of determining the composition of fracturing fluids.

Questions Related to the Diesel Fuels Description

Do the six CASRNs in the recommended description adequately describe diesel fuels? If not, what other factors should be considered in the definition? Are there additional CASRNs that should be included? Are there any among the six that do not belong? Please address the relative importance of having a description that is static and unchanged versus capturing new chemical compounds being developed that are substantially similar to the six recommended CASRNs.

- Would a description based on chemical, physical and use-based attributes, such as the five-consideration alternative EPA considered in (i), more adequately and

appropriately characterize diesel fuels in a manner that prevents endangerment of human health and underground sources of drinking water on an ongoing basis? Are there other ways the Agency could address any existing or newly developed compounds, such as CASRN 64741-44-2, not on the current list of six CASRN in the draft guidance that may meet the chemical, physical and use-based attributes of the six CASRN of the recommended description of diesel fuels, whether or not they have “diesel fuels” in the name or description?

- Would approach (ii), based on the strict limits of the TSCA physical and chemical characteristics, but with no reference to suitability for use in a diesel engine, be a more appropriate description for permitting diesel fuels under the EPA UIC Program? Please explain why this approach is preferred.
- Would approach (iii), which captures many more compounds that may or may not be suitable to run a diesel engine, more adequately and appropriately characterize diesel fuels for EPA UIC permitting purposes? How would you suggest permit writers and applicants efficiently and effectively identify chemicals meeting this description?
- What other approaches should EPA consider in describing diesel fuels?
- In the 2005 Energy Policy Act, Congress revised the SDWA definition of “underground injection” to specifically exclude from UIC regulation the “underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities” (SDWA Section 1421(d)(1)(B)). The Energy Policy Act of 2005 does not specify a threshold concentration or percentage of diesel fuels in the HF injectate that would qualify for exclusion from regulation. EPA requests comment on whether some *de minimis* level of diesel fuel constituents in HF fluids or propping agents

should be used. Commenters who support such an approach should also recommend how such a *de minimis* standard should be defined or described and explain the basis for their recommendations.

b. Diesel Fuels Usage Information:

Questions Related to Diesel Fuels Usage Information

- EPA seeks reliable data about volumes and frequency of diesel fuel usage in hydraulic fracturing fluids or propping agents (based on the recommended description). EPA welcomes data of this nature at any time.
- In developing the draft guidance, EPA found that the primary uses of diesel fuels in hydraulic fracturing are as a primary base (or carrier) fluid, or added to hydraulic fracturing fluids as a component of a chemical additive. In some cases diesel fuels-based fracturing fluids are more efficient for transporting and delivering propping agents into fractures, as compared to water-based compounds. As an additive component, diesel fuels may be used for a range of purposes, including adjusting fluid properties (e.g., viscosity and lubricity) or as a solvent to aid in the delivery of gelling agents. EPA seeks additional information on the uses of diesel fuels during underground injection associated with hydraulic fracturing, and information about the efficacy of any substitutes for diesel fuels, including where substitution may be infeasible or raise other technical issues.

c. Permit Duration and Well Closure. UIC regulations provide for Class II permits to be issued up to the operating life of the facility, or for a shorter period. Class II UIC permits usually extend through the time of plugging, abandonment and closure of a well. However, because hydraulic fracturing activities are immediately followed by oil or gas production, the draft guidance recommends two approaches for permitting

wells allowable under the UIC Class II regulations to address the unique nature of hydraulic fracturing. EPA permit writers may: (1) issue short-duration permits and convert wells out of the UIC program upon completion of the diesel fuels hydraulic fracturing activity, or (2) they may assign the well to “temporarily abandoned” status. The first approach releases the well from UIC requirements after the permit expires, while the second maintains the permit in active status until final plugging and abandonment of the well, with the possibility of reduced monitoring and reporting during production. The second approach may be beneficial to operators who might conduct future hydraulic fracturing of the well using diesel fuel, as it would avoid the need for them to obtain a new UIC permit for this activity.

Question Related to Permit Duration and Well Closure:

- What additional approaches should EPA consider for UIC permitting of diesel fuels hydraulic fracturing injection wells to effectively address well closure, plugging and abandonment requirements?

d. Area of Review. Delineating and evaluating an AoR is one of the cornerstones of the UIC Program. It ensures that there are no conduits in the vicinity of the injection well that could enable fluids to migrate into USDWs. Before proceeding with the project, owners or operators must define the appropriate AoR; assess that area for conduits of potential fluid movement; and, if necessary, perform corrective action, such as the plugging of improperly abandoned and orphaned wells, or re-siting the well to account for any conduits that could potentially cause migration of contaminants into USDWs. There are two methods for delineating AoR: (1) determining the zone of endangering influence (ZEI), or (2) using a minimum one-quarter ($\frac{1}{4}$) mile fixed radius around the well. The recommended approach in the

draft guidance provides four alternatives to these approaches that address the importance of using a site-specific area of review calculation and take into account not only the wellhead, but also the horizontal section of the well. EPA also recommends EPA permit writers avoid using the modified Theis equation when delineating the AoR.

Questions Related to Area of Review:

- What additional area of review delineation approaches would you consider effective for the purposes of permitting hydraulic fracturing using diesel fuels?
- How would you ensure that the area of review appropriately accounts for the horizontally drilled sections of the well without being computationally burdensome?
- Are there circumstances where it would be appropriate to use the standard approaches (e.g., $\frac{1}{4}$ mile radius around the well) for determining AoR?
Commenters should explain how the standard approach would provide appropriate protection for USDWs.

e. Information Submitted with the Permit Application. Information submitted and evaluated during the permit application process supports permitting decisions and ensures that appropriate safeguards (e.g., permit conditions) are established to prevent or remedy contamination to USDWs. HF using diesel fuels may pose a number of unique risks to USDWs. Due to high injection pressures, there is potential to induce fractures that may serve as conduits for fluid migration, including harmful chemicals found in diesel fuels. In addition, there has been concern about induced seismic events related to Class II activities. The UIC regulations allow flexibility in

permitting to account for local conditions and practices. Under 40 CFR 144.52(a)(9), EPA permit writers may request and review additional information from the owner or operator when evaluating a permit application for a diesel fuels HF well.

Questions Related to Information Submitted with the Permit Application:

- Standard industry research and exploration field collections, such as geologic cores, outcrop data, seismic surveys, and well logs, provide additional data on the injection and confining zones, including their areal extent, mineralogy, porosity, permeability, and capillary pressures and geology or facies changes. Access to this data could provide EPA with critical information needed to make effective permit determinations. Should EPA recommend collection of such data with the permit application? Commenters should consider the relative importance of these data to protection of human health and underground sources of drinking water versus any additional workload for applicants.
- Geomechanical characteristics of the confining zone such as, information on fractures, stress, ductility, rock strength, and in situ fluid pressures, help predict the propagation of fractures and indicate the potential risk of fluid migration. Should EPA recommend collection of geomechanical data with the permit application to assist EPA in making effective permit determinations? Commenters should consider the relative importance of these data to protection of human health and underground sources of drinking water versus any additional workload for applicants.
- Should the Agency request submittal of seismic data, such as the presence and depth of known seismic events and a determination that injection would not cause

seismicity that interferes with containment, with the permit application? How useful would inclusion of these data be to minimize potential risk of endangerment to USDWs? Please provide rationale in support of your response.

- What other information, if any, should EPA recommend be submitted with the permit application to make permitting decisions that are protective of human health and underground sources of drinking water?

f. Monitoring.

Question Related to Monitoring:

- The recommended monitoring approaches include specifications for mechanical integrity testing prior to and after hydraulic fracturing injection using diesel fuels. These recommendations ensure that the well maintains integrity during operations, given the high pressures and nature of fluids injected during hydraulic fracturing. What additional approaches for monitoring of well integrity should EPA consider to ensure safe and effective injection well operation?
- According to standard industry monitoring practice, data are collected through means such as microseismic monitoring and/or tiltmeter monitoring to characterize the actual fracture network and compare it with the predictive fracture model. Should EPA include a microseismic and/or tiltmeter monitoring, or any other approaches, in the guidance recommendations, to ensure that the fracture network does not pose a potential risk to USDWs? Please provide a rationale for your answer.

- Baseline and periodic monitoring of water quality for all USDWs within the area of review help demonstrate the protectiveness of permitted operations and are recommended by the American Petroleum Institute (HF1, 2009). Water quality monitoring can be especially important in cases where owners or operators wish to exercise a flexibility recommended in the guidance of either being released from the UIC program or operating as temporarily abandoned after injection has ceased and production has begun. To utilize these flexibilities, owners or operators need to demonstrate that their operations have not (or will not) endangered USDWs in the project area. Should EPA include baseline and/or periodic monitoring of USDWs as a recommended monitoring approach in the guidance? If so, what water quality monitoring data should be included to best ensure non-endangerment of USDWs?

Date: May 4, 2012

Nancy K. Stoner

Acting Assistant Administrator,

Office of Water.

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